

**Council on Postsecondary Education
2004 Annual Report
Knowledge-Based Economy Programs**

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House Bill 572 Knowledge-based Economy Programs**

A. BACKGROUND

The Kentucky Innovation Act of 2000 (HB 572) established the Office of the Commissioner for the New Economy. Its mission is to lead the statewide initiative to spur the growth of the knowledge-based economy or new economy in Kentucky. The 2000 Kentucky General Assembly charged the Office of the Commissioner for the New Economy with developing a statewide strategic plan for the new economy. The Department of Innovation and Commercialization for a Knowledge-Based Economy (DICKE) facilitated development and implementation of Kentucky Innovation the statewide strategic plan for development of the technology-centered economy in the Commonwealth. The Department is assisted by the Kentucky Innovation Commission and includes participation from the Council on Postsecondary Education, Cabinet for Economic Development, the Kentucky Chamber of Commerce and other statewide partners. The complete strategic plan is available online at www.one-ky.com/plan.html.

Drawing on area-wide strategic plans covering six regions of Kentucky; the statewide strategic plan focuses on five priority research focus areas and seven special opportunities identified as areas in which Kentucky already has developed a national or international reputation. The plan defines goals, sets priorities and charts a strategy for success in the New Economy. It also identifies performance indicators by which to measure progress made by Kentucky over the next decade.

HB 525, 2002 Regular Session, calls for the Council to submit an annual report on the knowledge-based economy programs to the Kentucky Innovation Commission, the Governor, and the General Assembly. The report is to include progress made in achieving each program's purposes, qualitative and quantitative information concerning the applications received, projects approved and undertaken, companies served, funding amounts invested in each project or program, and findings and recommendations to increase each program's effectiveness.

The following list briefly describes knowledge-based economy programs for which the Council has responsibility via annual contracts since 2001 with the Kentucky Science and Technology Corporation (KSTC) to create, manage and develop various KIA programs. These include:

- Commercialization Investment Funds (CIF):
 - R&D Voucher Fund
 - ICC Concept Pool
 - Rural Innovation Fund

- Kentucky Commercialization Fund
- Kentucky Science and Engineering Foundation (KSEF)
- Kentucky Experimental Program to Stimulate Competitive Research (EPSCoR)

NEW APPROACH

The implementation of these KIA programs represents a new approach to investing Kentucky funds in Kentucky's future. The new programs (CIF and KSEF) have been designed by KSTC as investments with contractual expectations for returns on investment (ROI) upon financial triggers when a new technology begins to generate substantial revenues. The ROI payback arrangements, primarily CIF for investments, are the first of their kind in Kentucky, whereby any negotiated financial returns are to be reinvested in KIA programs. This type of negotiation has been completed with 19 companies.

PROGRAM ANALYSES

The data analyses of CIF and KSEF programmatic activities include all investments since 2002, the first year such awards were made by KSTC after the start-up period to create the programs. Please be advised that discrepancies can occur because of the dynamic nature of these programs, which involve contract negotiation that do not automatically result in a signed agreement, or others may be canceled if a faculty leaves the state. Therefore, number of awards, as approved by KSC, may not equal number of active projects reported by the individual programs. Moreover, CIF companies eligible for multiyear awards originally were approved only on an annual basis and counted each time a new-year award was made. During FY04, the protocol was streamlined for efficiencies whereby such approvals may include multi-year amounts but the annual contractual amounts paid are negotiated based on applicant performance, ongoing technical reviews and due diligence.

Also note that a transition is underway in data reporting by the EPSCoR program. Starting with FY03 data, EPSCoR has begun the transition to reporting formats that are conducive to analysis by KIA research focus area. This is relevant in that the total lump sum program investments from the FY01 and FY02 are listed to help provide a more comprehensive picture of EPSCoR program activities since the passage of the Kentucky Innovation Act.

The EPSCoR is funded by six different federal agencies, which operate on fiscal years different from the State and, in many cases, each other. Reasonable caution is advised in making direct comparisons of federal funds with State funds that operate exclusively on the State fiscal year.

FINANCIAL REPORTING

Fund balances and related financial information contained in this summary also are presented for both program and administrative activities. This covers all relevant years to date for which KSTC has entered into contracts with CPE for creating and administering these programs, i.e., FY01, FY02, FY03, and FY04.

The financial data address: State appropriations and disbursements; KSTC receipts, expenditures and fund balances; and FY04 actual distribution of staff salaries across these KIA funds, is based on monthly allocations of time.

B. PRIORITY FOCUS AREAS

Consistent with the priority focus areas established by the State, KSTC has invested funds under the Commercialization Investment Funds (CIF) and the Kentucky Science and Engineering Foundation (KSEF) exclusively in the areas of Biosciences, Environmental and Energy Technologies, Human Health and Development, Information Technologies and Communications, and Materials Science and Advanced Manufacturing. The Kentucky Experimental Program to Stimulate Competitive Research (EPSCoR) has made these a priority where feasible in complying with guidelines with the federal agencies that sponsor EPSCoR funding and with other priorities set by the Statewide EPSCoR Committee.

C. THE FUNDS

COMMERCIALIZATION INVESTMENT FUNDS (CIF)

The Commercialization Investment Funds (CIF) are a series of pre-seed and seed stage capital funds aimed at promoting and developing early stage technology companies in the Commonwealth of Kentucky. There are four funds within CIF: Kentucky Commercialization Fund, Rural Innovation Fund, R&D Voucher Fund, and ICC Concept Pool Fund.

The basic eligibility requirements, available funds for each, investment amounts, application frequency and whether or not the investment is subject to payback are provided in Table 1.1.

TABLE 1.1 CIF Program Descriptions

CIF Fund:	Kentucky Commercialization	Rural Innovation	R&D Voucher	ICC Concept Pool
Eligibility:	Proposal must come from university faculty (pre-company) to commercialize a technology/product/process. Work must be done at faculty member's organization.	Rural Kentucky based companies with less than 150 employees. Must use funds to contract with a third party consultant.	Kentucky-based companies with less than 150 employees Must contract with an accredited postsecondary institution.	These funds are a carve-out of the R&D Voucher Fund. ICC companies in good standing, working the ICC Process.
Target:	Faculty members	Inventors or entrepreneurs	Existing Companies or Entrepreneurs	Existing Companies or Entrepreneurs
Annual State Funding	\$750,000	\$1,000,000	\$2,800,000	\$200,000
Investment Amount(s)	\$75,000/year for up to 3 years	\$50,000/year for up to 2 years	\$100,000/year for up to 2 years	\$25,000 1x award
Matching Requirement	None	None	1:1	1:1
Application Frequency	1x/year	3x/year	3x/year	open
Payback Required?	yes	For any cumulative award amount > \$25,000	yes	no

KENTUCKY SCIENCE AND ENGINEERING FOUNDATION (KSEF)

Under the Kentucky Innovation Act, the General Assembly directed the Kentucky Science and Technology Corporation (KSTC) to create and manage the Kentucky Science and Engineering Foundation as a means to increase Kentucky's capacity to become a leader state in competitive research by making its own investments in peer-reviewed science and engineering research and by attracting more research funding from all sources to the Commonwealth. This mission is carried out under four programs as follows.

R&D Excellence - purpose is to achieve excellence in science and engineering and allow innovation and technology development in existing and emerging areas of research by making proactive investments through an annual peer-reviewed competitive selection process.

TABLE 1.2 KSEF: R&D Excellence Grant Categories

R&D Excellence Grant category	Average Grant Size and Length	Eligibility	Approximate Annual Budget for State Funding	Matching Requirement (cash/in-kind)
Exploratory Adv. Research	\$50,000/Year for up to 2 Years	University Faculty	\$800,000	1 to 1
Purpose-Driven Research	\$30,000/Year for up to 2 Years	University Faculty	\$600,000	1 to 1
Emerging Technologies	\$40,000/Year for up to 2 Years	University Faculty & Sm. Businesses	\$400,000	1 to 1
Emerging Ideas	\$15,000 for up to 1 Year	University Faculty	\$200,000	None

Technology Capacity Building – purpose is to build and enhance capacity in developing intellectual property and technology portfolio and understanding of the technology transfer process and federal programs for small businesses.

Human Resource Development – purpose is to build and retain excellent human capital by providing appropriate science and engineering training to students through creative programs and by enhancing the knowledge and skill set of the providers through on-site short courses.

Information Resources Center – purpose is to become a one-step information resource center by gathering and disseminating the information on science and engineering in Kentucky.

EXPERIMENTAL PROGRAM TO STIMULATE COMPETITIVE RESEARCH

(KY EPSCOR)

The Kentucky Statewide EPSCoR (KY EPSCoR) Program’s mission is to enhance the research and intellectual capacity of universities and colleges by building and coordinating strategic investments in human capital and physical infrastructures necessary for Kentucky to excel in federal R&D funding competitiveness. The Statewide Program is divided into two programmatic areas: the *Federal Agency EPSCoR Program*

which requires state matching funds, and the *KY EPSCoR Infrastructure Seeding Program* which requires institutional matching funds and a commitment to submit a proposal for federal R&D funding. Federal agencies operating EPSCoR programs include: National Science Foundation (NSF), NASA, Department of Energy (DOE), Department of Defense (DOD), Environmental Protection Agency (EPA), and National Institutes of Health (NIH).

TABLE 1.3 EPSCoR Program

Federal Agency Program	Federal Grant Fiscal Year	Period of Performance	Federal Requirement for Matching Funds	Sample Annual Budget for State Funds
NSF	3/1-2/28	3/02-2/05	2 to 1	\$1,325,156
NASA	8/1-7/31	8/01-7/06	1 to 1	\$200,000
DOE	7/1-6/30	7/03-6/06	1 to 1	\$600,000
EPA	10/1-9/30	10/01-9/04	1 to 1	\$5,000
NIH	varies	varies	none	\$0
USDA	varies	varies	none	\$0
DOD	varies	Varies	2 to 1	\$0
Infrastructure Support (State)	7/1-6/30	Varies	varies	\$2,130,156

D. THE INVESTMENTS

The following table represents an overview of KSTC's KIA investments for the period of FY01-FY04. Included are analyses of numbers of awards and State and Non-State matching funds by:

Table 1.4
KSTC OVERVIEW OF INVESTMENTS BY KIA FUND
FY01-FY04

KIA FUND	Actual Investments (#)				Actual State Investments (\$)				Non-State Matching on Investments* (\$)			
	FY01	FY02	FY03	FY04	FY01	FY02	FY03	FY04	FY01	FY02	FY03	FY04
CIF- Commercialization		7	2	8		477,553	149,999	459,137		-	-	-
CIF- Rural Innovation		8	32	62		236,900	276,000	1,036,423		-	11,071	43,500
CIF- R&D Voucher		6	5	16		699,732	500,000	2,500,000		1,011,586	1,703,905	1,449,801
CIF- Early Concept Pool		-	4	4		-	99,912	100,000		-	122,415	101,125
CIF Subtotals		21	43	90		1,414,185	1,025,911	4,095,560		1,011,586	1,837,391	1,594,426
CIF 3-Yr Subtotal				154				6,535,656				4,443,403
KSEF		31	53	53		1,940,192	2,155,870	1,902,161		1,359,722	1,148,928	1,852,999
KSEF 3-Yr Subtotal				137				5,998,223				4,361,649
EPSCoR	55	55	78	78	2,429,600	2,342,600	2,631,000	2,275,159	9,465,000	12,890,000	13,158,928	15,940,189
EPSCoR 4-Yr Subtotal				266				9,678,359				51,454,117
Annual Totals	55	107	174	221	\$ 2,429,600	\$ 5,696,977	\$ 5,812,781	\$ 8,272,880	\$9,465,000	\$ 15,261,308	\$ 16,145,247	\$ 19,387,614
Cumulative GRAND TOTALS				557	\$			22,212,238	\$			60,259,169

E. PUBLIC AWARENESS

Announcements were released to the media after each major funding approval.

The second annual Innovation and Enterprise Conference was held in March 2004 featuring the researchers and entrepreneurs in which KIA funds have been invested. Posters and tabletop demonstrations were available for awardees from CIF, KSEF and EPSCoR. In addition, a series of sessions were arranged for select companies to pitch their technologies to a panel of venture capitalists from around the region. Approximately 300 people attended the 2004 conference. The third annual conference has been scheduled for March 30, 2005.

A "Portfolio of KIA Investments" has been prepared and routinely updated as new investments have been approved by the KSTC Board of Directors and contact negotiations completed with the applicant. The portfolio of projects approved through June 30, 2004, is available online at www.kstc.com.

Brochures on various funds have been prepared and are disseminated at every opportunity. Websites for each program are a main source of up to date information on request for proposals, funding guidelines and award announcements. CIF is www.startupkentucky.com; KSEF is <http://ksef.kstc.com>; EPSCoR is www.kyepscor.org. In addition, the KSTC website links all these sites in one address at www.kstc.com. Brochures for each program have been developed.

F. FINANCIAL HIGHLIGHTS

<u>Highlights</u> July 1, 2000 - June 30, 2004 557 Investments \$22.2M State Funds Invested \$60.3M Non-State Matching
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EPSCoR Program Funds from CPE to Universities

The Summary of Receipts, Expenditures and Fund Balances do not reflect matching funds transferred directly from CPE to various Kentucky postsecondary institutions to leverage federal EPSCoR and EPSCoR-type grants. These transfers are coordinated by KSTC pursuant to a Personal Service Contract with CPE and corresponding Memoranda of Understanding with KSTC.

KSTC, in conjunction with the EPSCoR staff and institutions, has begun an EPSCoR fiscal reporting structure to analyze budgeted versus actual federal and state matching receipts, expenditures, and fund balances for each fiscal year by funding source, institution, and project. The complexity of federal funding streams suggests that this will be an evolving process.

G. OTHER COUNCIL ACTIVITIES

In addition to those investments made through KSTC, the Council has a number of other knowledge-based initiatives:

- 1) **Bucks for Brains** (see Figures 2, 3, 4) - The Endowment Match Program matches state dollars with private donations to encourage research at UK and UofL, and to strengthen key programs at Kentucky's comprehensive universities. All funds, both public and private, must be endowed, which provides a perpetual source of funding for research-related activities. Endowment proceeds can be used for endowed chairs, professorships, research scholars, research staff, fellowships, scholarships, research infrastructure, and mission support at the public universities.

The General Assembly has appropriated a total of \$350 million to this program over the past six years. Of that amount, \$300 million was allocated to the two research universities, and \$50 million was allocated to the six comprehensive institutions. There have been three rounds of funding for the program: \$110 million in 1998-2000; \$120 million in 2000-02; and \$120 million in 2002-04. Once the institutions have fully matched their 2002-04 allocations, a total of \$700 million will be dedicated to the endowments of Kentucky's public universities.

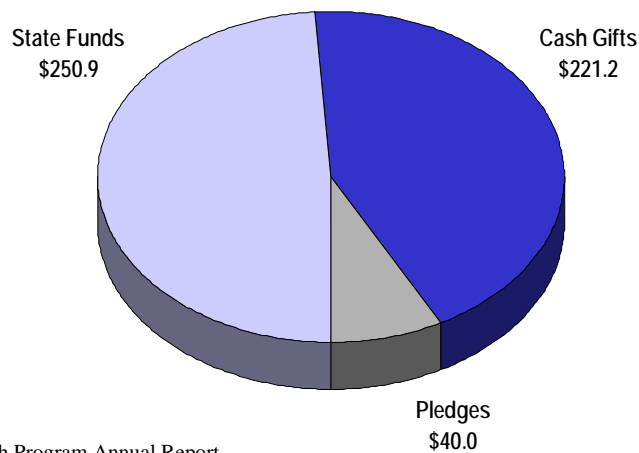
During 2003-04, Kentucky's public universities added \$49.8 million in cash gifts and state funds to their endowments through the Endowment Match Program. These funds supported the creation of nine new endowed chairs and 25 new endowed professorships during the fiscal year, as well as multiple fellowships, scholarships, and mission support programs. Overall, between 1997 and 2004, the number of endowed chairs at all institutions increased from 55 to 187 (240 percent), and the number of endowed professorships increased from 53 to 261 (393 percent) since the program began.

Bucks for Brains has helped public universities attract quality researchers dedicated to advancing knowledge, developing products, building businesses, and improving the health and well-being of Kentucky's citizens. The program also has aided universities' efforts to attract federal research dollars to Kentucky. Between 1997 and 2002, federal research and development expenditures at Kentucky's research institutions increased from \$75.6 million to \$139.4 million, or by 84.4 percent. Over that same period, extramural research and development

expenditures increased from \$105.2 million to \$220.4 million, or by 109.5 percent.

A fourth round of Bucks for Brains was requested for 2004-06 totaling \$61 million—\$50 million to be divided between UK and UofL, \$10 million among the comprehensive universities, and \$1 million for KCTCS. The Council also requested \$217.9 million in construction to support Bucks for Brains faculty and other research programs. Without a state budget, as of this writing these requests have not been met.

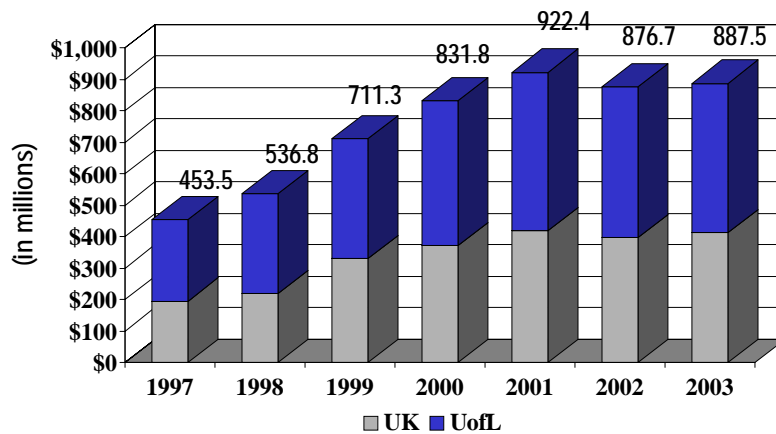
Figure 2. Private Funds Leveraged
Through the Match Program



Source: Match Program Annual Report

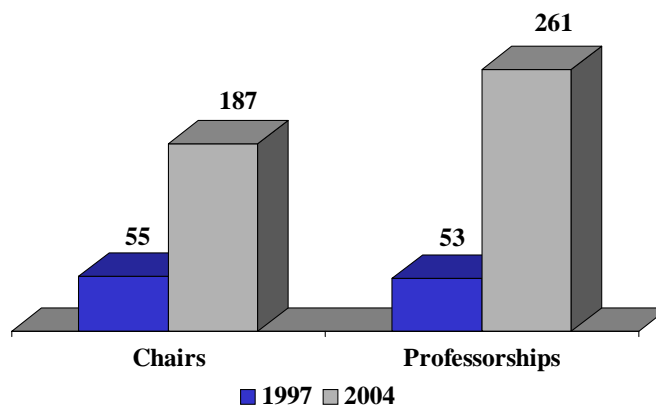
As of 6-30-04

Figure 3. Growth in Endowment Market Value (1997-2003)



Source: NACUBO Endowment Study

Figure 4. Growth in Endowed Chairs & Professorships (1997-2004)



Source: Match Program Annual Report

- 2) **Homeland Security** - A consortium of Kentucky's postsecondary education institutions, facilitated by the Council, prepared and submitted 99 homeland security concepts to the Department for Homeland Security demonstrating Kentucky's capacity to conduct collaborative research advancing the nation's Homeland Security priorities. Following a national review, Congressman Rogers announced the funding of \$4.3M to the postsecondary institutions to investigate a number of homeland security priority areas, initiating collaborative institutional projects that will provide economic and workforce development. These awards were announced November 2004.
- 3) Governor Fletcher and the Cabinet for Economic Development Commissioner, Mr. Host, have requested the Council to solicit research proposals in collaboration with other postsecondary institutions and private industry focused on the state's economic development priorities. Each of the postsecondary institutions, including the research, comprehensives, technical and community, as well as the private institutions submitted proposals. These proposals have been reviewed, grouped by areas of interest and revised with submission to Commissioner Host for consideration of \$10M funding.
- 4) **Research and Commercialization** - Research and commercialization are dynamic enterprises encompassing both traditional scholarship and emerging technologies. Kentucky researchers are discovering new knowledge, advancing the economic growth, and are producing results that benefit Kentuckians. Following are some examples of ongoing research at Kentucky postsecondary institutions:

Advanced Automotive Manufacturing in conjunction with the Visualization and Immersion Center, with Kentucky Community and Technical College System (KCTCS), Morehead State University (MoSU), University of Kentucky (UK), and University of Louisville (UofL).

There are a number of programs, including KCTCS' Center for Excellence for Automotive Manufacturing to meet the demand for companies to transform and adopt higher technologies. KCTCS also is working with UK in the Center for Excellence in Lean Enterprise to support the training from manufacturers applied to a variety of service industries, including healthcare. MoSU has a Center for Computer Integrated Manufacturing Technology that enhances engineering and industrial/manufacturing education opportunities through technology transfer with cooperative education programs with Kentucky Manufacturing Assistance Center developing on-site training initiatives with industry. This instruction enhances applied research opportunities in the region. UK has established an Engineering Design Center where engineering students are employed to work on design and analysis work for the automotive and aerospace industry. UK's Transportation Technology Research Center is providing an advanced degree program in

automotive/aerospace engineering and a research consortium. UofL has created an Institute for Innovation in Advanced Materials for Manufacturing to access advanced materials technology to create and produce products. These advances include plastics, Nano and MEMS technology, rapid prototyping of composite, aerospace and surgical implant materials and visualization facilities.

Agricultural/Materials Science with Eastern Kentucky University (EKU), Kentucky State University (KSU) Morehead State University (MoSU), Murray State University (MuSU), University of Kentucky (UK), University of Louisville (UofL), and Western Kentucky University (WKU).

- a) Agriculture: With the decline of Kentucky's agricultural dependence on tobacco come opportunities for advancing agricultural and materials science with natural products and resources abundant in Kentucky. A number of the postsecondary institutions are investigating such science with aqua agriculture (KSU) transitioning from tradition farming methods to adopting new equipment and materials to facilitate rapid enterprise from the aquaculture incubator and technical training institute. Others are improving beef production as an agricultural production industry by increasing forage management and adding value to beef produces leading to new jobs creation and corporate recruitment to the state (EKU, MoSU).
- b) Energy: MuSU has been affiliated with a Consortium for Energy and the Environment to support applied research related to energy resources and environmental matters. Similar work is being done by WKU in natural products - sulfur, coal, gas as well as collaborating with the parks' system and the South Central Technology Center to improve existing business and fostering new innovations to work with biotechnology companies analyzing soil samples, animal waster management systems as well as water safety monitoring and conservation.
- c) Natural products: UK's Center for the Integrative Natural Sciences and Mathematics and Natural Products Alliance are working with bioprocessing technologies to merge agricultural and medical research.

Tourism/Arts – with Morehead State University (MoSU), Murray State University (MuSU), Northern Kentucky University (NKU), and University of Louisville (UofL).

Kentucky's rich heritage in cultural arts, historic to the Appalachian region of the state, but appreciated and sought throughout the nation, is an economic resource. MoSU's Center for Cultural Heritage is expanding and accelerating the development of tourism-related business enterprises based on cultural heritage opportunities merging music with theatre, literature, and visual arts. MuSU's Western Kentucky Corporation is doing similar work supporting economic development through tourism and related projects. NKU has proposed a strong interdisciplinary tourism program, capitalizing on the strengths of the cultural heritage and tourists' requests. UofL's Arts Council has established goals to

recruit talent in social, cultural and artistic amenities, a supportive mechanism to attract tourism and encourage the performing arts in the region.

Entrepreneur and Small Business Development with Northern Kentucky University (NKU), University of Louisville (UofL), and Western Kentucky University (WKU), in alliance with connectKy and the Kentucky Commerce Cabinet.

Most all of the postsecondary institutions are participating in ICCs and Small Business Development in conjunction with the work of the Kentucky Science Technology Corporation (KSTC). Advancing small business ventures, finding capital, identifying the needs and projecting commercialization are high priorities for all postsecondary institutions. In collaboration with KSTC and DICKE, entrepreneurs are encouraged and advised on the development and management of small business models. In October 2004, connectKy went online linking research outcomes to innovation and commercialization concepts. Although some alternative funds for these projects exist, their growth is dependent on expanding and adapting the models of successful entrepreneurship currently being developed. NKU has established a reputation to linking technology, workforce, intellectual capital and applied research the successful recruitment of knowledge-based companies. WKU has a Center for Entrepreneurship and Innovation promoting and supporting entrepreneurial ventures in the region by providing business planning and development assistance. UofL's Entrepreneurship Academy is another developed program that focuses on researching critical success factors for startup and small businesses including minority- and family-owned businesses. They have focused on the transfer of academic research to business development. UofL has a new doctoral program in entrepreneurship and KCTCS is now offering an associate degree program in the area, modularized and online to accommodate students with an interest in this area.

Health/Bioscience – Nursing and Allied Health, Eastern Kentucky University (EKU), Kentucky State University (KSU), Northern Kentucky University (NKU), and Association of Independent Kentucky Colleges and Universities (AIKCU).

Kentucky's postsecondary training of nurses and allied health professions has a strong reputation, attracting students from many states. ECU, KSU and NKU have exceptional nursing programs, with UK, UofL, ECU and WKU providing graduate work in the health field. The independent colleges have had great success, as well, in the training of many in the health professions. Although there may be alternative sources for programmatic funding, the potential to provide the much needed educated workforce as our nation ages and requires more from the healthcare system, the postsecondary institutions are doing exceptional work in this arena. In addition to training healthcare professions, bioscience research opportunities in pharmacy, cardiovascular device innovations, and proteomics are tremendous areas for potential growth and continued education and research.

Information Technology and Communications with Kentucky Community and Technical College System (KCTCS), Morehead State University (MoSU), Murray State University (MuSU), Northern Kentucky University (NKU), and Council on Postsecondary Education's (CPE) Postsecondary Education Network (KPEN), and connectKentucky.

The success of much of new economic development is dependent on the development of information technology and communications businesses. All of the postsecondary institutions are involved in this technology and working diligently to stay in the constantly changing stream of new technology. Much of the information technology is being spurred by Homeland Security, healthcare reforms, and the massive amounts of information to be transmitted, stored, easily retrieved, and most of all understood. ECU has a number of geospatial, surveillance, recognition and tracking research projects underway, some with responsibilities linked to the Department of Defense. MoSU and MuSU have telecommunications management and radio resource centers. NKU has developed an Institute for Information, Application and Analysis to serve as an information science services broker to and between the public and private sectors. The Council and Commerce Cabinet are working together to support the exchange of information and ideas, integrating the research community with the business community (connectKy.org) while keeping the educational community well connected through the Kentucky Postsecondary Education Network (KPEN). This area of technology is explosive, ever changing, and providing a challenge to the most gifted student and the best entrepreneurs. Opportunities to contribute to Kentucky's economy through the interactive digital technology is untapped and a true source of potential economic development.